Development of and adherence to a gamified environment promoting health and wellbeing in older people with mild cognitive impairment.

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Abstract

Overview and aims: This project aimed to promote active aging by delivering tasks via a tablet computer to participants aged 65-80 with mild cognitive impairment. The aims were to develop an age-appropriate gamified environment and to assess application adherence through an intervention.

Methods: The gamified environment was developed through a series of three iterative user-centered focus groups. Adherence was assessed by the time spent engaging with applications over 47 days supplemented with participant interviews. There were two groups of participants: one of 11 people living in a retirement village (1 male; mean age=75.4, SD=5.14; mean MoCA=26.0, SD=2.28) and the other of 13 people living separately across a city (1 male; mean age=74.9, SD=3.68; mean MoCA=24.4, SD=1.19).

Results: There was a significant difference in the mean number of sessions for retirement village participants (mean=29.1, SD=14.8) and those living separately (mean=8.8, SD=7.5), adjusted t(14.3)=4.1, p=0.001 with retirement village participants engaging in three times the number of game sessions compared to the other group possibly because of different between group social arrangements. Interview thematic analysis at follow-up revealed that participants enjoyed the social aspects of the project, liked computer games and engaging in them made them feel better.

Discussion and Conclusions: An age-appropriate user-designed gamified environment can help older people with mild cognitive impairment engage in computer-based applications and can impact them positively. However, social and community factors influence adherence in a longer-term intervention.

Introduction

Gamification is defined as the use of game design elements in non-game contexts to encourage users, to increase activity and participation. This project delivered a lifestyle intervention on a tablet computer and aimed to help participants improve their nutrition, increase physical activity, socialization and cognitive function and encourage active ageing. There were two main aims: first to design a gamified environment through which applications could be delivered; and second to test the adherence to this technology solution through an intervention where older people were asked to play serious games over a 47 day period. We first investigated preferences of individuals through a series of focus groups. In the intervention that followed, the adherence to technology was assessed both quantitatively by measuring the engagement with the tablet-delivered applications and also qualitatively by interviewing participants and assessing their experiences. We were interested in whether adherence in older people depended on factors such as housing arrangements of participants. We therefore assessed two groups of older people. One group was living independently in a retirement village that had communal areas for social interaction and the other group was spread across a large city.

Methods

- Development of gamified environment.

Three focus groups were conducted as part of an iterative user-centred design process in the development of serious games and gamification.

- Intervention and adherence to protocol

Participants aged 65-80 years old with mild cognitive impairment were recruited to be part of the intervention. One group of 11 people were based in a retirement village. The other group of 13 participants were living separately across a large city. Following an initial 17 training period there was a 47 day intervention when participants played games on a tablet computer. The amount of time participants used the apps to promote cognition and exercise was recorded remotely

- Post-Intervention Participant Interviews

Eight participants were interviewed after the intervention about their experience. Interviews were transcribed and analysed thematically.

Results

- Gamified environment

Participants said they played cognitive games to keep their brains active. Themes that emerged for gamification included pets, travel and collections. A scenario was developed where game progress was represented as walking a dog through a city and collecting postcards of landmarks.

Gamified environment illustrating the path through the city and landmarks where postcards would be collected.

- Adherence to intervention

Following the intervention phase 435 distinct sessions on the tablet computers were recorded for all participants. An independent-samples t-test was conducted to compare the number of sessions between the two groups of participants. There was a significant difference in the mean number of sessions for retirement village participants (mean=29.1, SD=14.8) and those living separately (mean=8.8, SD=7.5), adjusted t(14.3)=4.1, p=0.001. These results suggest that community living tends to promote adherence to the tablet-delivered intervention.

Results (continued)

There was no significant difference in the mean participant session length between the retirement village participants (mean=1707 sec, SD=1040) and those living separately (mean=1747, SD=1436), t(22)=-0.07, p=0.94 suggesting that there was no group difference in how long they spent on the tablet computers in each session.

- Post-Intervention Participant Interviews

Thematic analysis of the interviews revealed a number of points: a positive experience "*You're never too old to learn, that's very true, and you know you got to be open to being forward thinking...because some things, you know, this digital age... and all this technology that's coming across, I mean it's fantastic...*" (participant E02). A sense of community was important to the retirement village participants "*I think one of the things that's really carried it for me of course has simply been the people involved*" (participant E06).

Discussion

Older people with no previous experience quickly learned how to use tablet computers. The gamified environment worked well to motivate older people to engage with applications. A mean session time of approximately 28 minutes demonstrated that participants were using applications. No significant difference between the mean session time of the groups possibly suggested that gamification promoted engagement equally well in the groups and was independent of participant location.

Participants in the retirement village engaged with more than three times the number of sessions as those participants living spread across a city. The main factors associated with this difference were: bonding and a sense of community plus face-to-face technical support for the group in the retirement village.

These results are consistent with previous results suggesting older people in general have less technical confidence with technology. Training older people helps improve their self-confidence and mobile applications have been demonstrated to help enhance the health of older people and maintain social relationships.

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